AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

A PEER REVIEW

FOR

Washington Metropolitan Area Transit Authority

Washington, DC

JULY 2016

A Service of the American Public Transportation Association
performed by the
North American Transit Services Association
a wholly owned subsidiary of APTA

REPORT

OF THE

NORTH AMERICAN TRANSIT SERVICES ASSOCIATION

PEER REVIEW PANEL

ON THE

THIRD RAIL POWER & INFRASTRUCTURE

PROVIDED AT

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

PANEL MEMBERS:
Thomas Aaron
Anthony Fazio
Vernon Hartsock
John Martin
Daniel Tinsley
Charles Joseph

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North American Transit Services Association
1300 I Street, NW, Suite 1200 East
Washington, DC 20005

Richard A. White, Acting President & CEO

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INTRODUCTION

In June 2016, Mr. Paul J. Wiedefeld, General Manager and CEO at the Washington Metropolitan Area Transit Authority (WMATA), contacted the American Public Transportation Association (APTA) to request a peer review of the agency's third rail system.

APTA, through its wholly owned subsidiary the North American Transit Services Association (NATSA) and through discussions between NATSA and WMATA staff, determined the review would be conducted July 25 – 29, 2016.

A panel of industry peers was assembled comprised of individuals with senior and executive industry leadership skills from within the public transit sector to provide advice, guidance, benchmarking and best practices. The onsite peer review panel consisted of the following individuals and the transit agencies from which they were selected:

THOMAS AARON
Director of Power
SEPTA
Philadelphia, PA

ANTHONY FAZIO
Manager of Engineering and Design, Track
SEPTA
Philadelphia, PA

VERNON HARTSOCK
Chief Engineer
MTA Maryland
Baltimore, MD

JOHN MARTIN
Senior Director of Power & Systems
MBTA
Boston, MA

DANIEL TINSLEY
Senior Manager of Power Maintenance
CTA
Chicago, IL

CHARLES JOSEPH
Director, Rail Programs
APTA
Washington, DC

The panel convened in Washington, DC. on July 25, 2016. Panel coordination and logistical support was provided by APTA Staff Advisor Charles Joseph. Mr. Joseph also coordinated panel member input in drafting this peer review report. Mr. Patrick J. Lavin and Mr. Chad T. Krukowski, provided agency liaison support.

METHODOLOGY

The NATSA peer review process is well established as a valuable resource to the industry for assessing all aspects of transit operations and functions. Peer review teams are comprised of highly experienced transit professionals who are selected on the basis of their subject matter knowledge. The purpose of using experienced subject matter professionals is to share methods, insights and experiences interactively with the requesting property. Through the utilization of on-site interviews of staff, review of relevant documents, and field inspections, the review team engages the requesting property in an informal process of introspective examination and dialogue on the areas of their concern.

The peer review concludes with a caucus among the peer review team to draw out the opinions of the team members and define a consensus summation of observations taken and their professional judgment as to where areas of improvement could be attained. This information is then presented to the requesting property in an exit conference, and followed by a report, if so desired by the requesting property. There are no expectations expressed or implied that the requesting property take any action to satisfy the opinions of the peer review team or to engage any members of the team in any follow up activities the requesting property may want to undertake as a result of the review. The information provided by the peer review team is consensus based and transferred to the requesting property as a "Pro Bono" work product which the transit property holds all rights to under the terms of the peer review agreement.

SCOPE OF THE REPORT

This report is focused on the scope of work as specified in the letter of request from the WMATA General Manager.

- Review of third rail traction power and infrastructure maintenance and inspection practices.
- Review and assess the role of the track geometry vehicle (TGV) in defining hot spots and methods of using the data.
- Review of the third rail cover board design.
- Review of the third rail cable securement.
- Review of the third rail insulator cleaning practices.
- Industry best practices as it relates to state of good repair and capital investment strategies.
- Rail Operations Control Center
- Other.

OBSERVATIONS

The panel found the interviewed WMATA staff to be cooperative. Their responses were positive regarding the new leadership in supporting shutdowns to enable work to be performed on the rail system.

The peer review team made visual inspections of the wayside with observations from a distance in the parking lot and from station platforms.

A site visit to one of the traction power substations found debris was staged with tape material stored outside the room next to a transformer currently out of service. Breakers on floor were racked out for line-up out of service. Breakers removed for extended periods are preventative maintenance checked prior to being put back in service. (See Photo 1)

Organization charts appear to be ambiguous in depicting how responsibilities are delineated and managed. Some departments appear to be sufficiently staffed but manpower could be utilized more effectively. For example, it appears that WMATA could benefit from additional qualified construction oversight and inspection staff.

The team's visual observations of sample cover board assemblies with regards to securement are considered adequate. The method of securing these cover boards is with a mushroom type button threaded from the top of the cover board and fastened with a cotter pin under the board. While this method is considered adequate, it does pose difficulties when carrying out inspections to verify that the cotter pin is in place and secure. Some agencies have the mushroom button threaded from under the board and secured with a nut on top. (See Photo 2 for traction power cover board securement assembly). We also found several areas where cover boards were missing.

WMATA has a Track Geometry Vehicle (TGV) that adequately meets its needs. Third rail gauge and profile data is available from TGV but appears to be used only on a conditional basis. Additionally, one revenue train has a thermal camera mounted on the front which also provides track data.

A video briefing depicted explosions, fires and glowing track bolts which clearly revealed significant issues associated with stray current. When stray current exists in large magnitudes, it often causes explosions which lead to fires. Currently all corrosion testing is being performed by external corrosion testing consultants.

WMATA has used the 'Orange Boot' design for connecting the feeder from the traction power substation and the jumper cables to the web of the third rail. This design has been used extensively for many years. (See Photo 3 for picture of the boot).

Track and traction power teams are working together to improve third rail insulator design and installation procedures.

It appears that various departments are siloed. For example there is inadequate communication between engineering and maintenance and other inter-departmental. Some of the siloing may have

detrimental effect on the procurement process from cradle to grave.

During various discussions with staff, the peer review team concluded that there is a vast amount of data that is being generated for several areas of the business, however, it is not clear how this is being analyzed and used in a meaningful way. For example: the data collected with reference to resistance testing of the traction power cables, it was unclear to the team if this data is being used to determine priorities in a capital cable replacement.

Based on staff interviews, many types of documents require updating, (i.e., documents such as standard drawing, organizational charts, maintenance practices etc.).

It is recognized that a comprehensive traction power manpower study has already been commissioned in order to better allocate personnel.

Engineering has solicited Traction Power Maintenance for input into Engineering Modification Innovations (EMIs), Standard Drawing reviews and project design. However, the team were told during interviews that sometimes stakeholders are not consistently solicited during capital project development.

To increase the negative return capacity, consider the use of an auxiliary return. This may also assist in the reduction of bobbing track circuits and stray current.

Third rail insulators were found to be excessively contaminated in the yard and on open deck areas. Soiled insulators result in a higher likelihood of arcing and a point of failure. (See Photo 4 for a cleaning method employed by one transit agency).

Rail Operations Control Center (ROCC) controllers appear to have a high work load with responsibilities for train scheduling, switching power ON/OFF, fire life safety (FLS) ventilation fan controls, RED TAG[1] procedures, etc. The ROCC controllers work load exacerbates the time it takes to implement RED TAG procedures and thereby a reduction in maintainers track time. Currently, Power Controllers only have responsibility for monitoring the current status of traction power and not for switching power ON/OFF.

Even though there is a design review process in place, the peer review team heard from some staff that key stake holders are not consistently solicited for their input at the various design milestones of 30%, 60% and 90% submittals.

[1] Red Tag Power Outage Procedure**:** Third rail power outage where the circuit breaker is physically removed from the power circuit and a red tag is issued to implement lockout/tag-out procedures. This procedure ensures that after removal of traction power and with other safety requirements in place it is safe for wayside workers to be on or near the third rail for performing inspection and/or maintenance work.

RECOMMENDATIONS

1. Third Rail Traction Power Infrastructure Inspection and Maintenance

a) Traction power substation housekeeping
   i) Housekeeping of traction power substations (TPSS) needs to be improved.
   ii) Ensure that substation equipment is free from dust.
   iii) Remove any unnecessary debris/equipment not relevant to DC Traction power substation.
   iv) Properly protect circuit breakers that are racked out of the switchgear.
   Dust, dirt and debris on the breaker could potentially lead to equipment failures and arcing within switchgear.
   v) The use of plastic sheeting to protect the gear from roof leaks should be discouraged.
   vi) Building infrastructure should also be included in preventative maintenance cycles.
   vii) WMATA to verify that TPSS preventative maintenance procedures being performed meets industry standards and best practices.

b) Roles and responsibility of traction power personnel
   Create positions that clearly assign ownership of specific areas of the power infrastructure (such as Traction Power Substation Maintainer, Electrician, Cable Maintainer and Bondsperson, etc.).

   It is understood that WMATA has undertaken a program to provide more clarity for roles and responsibilities for traction power personnel.

c) Technical capacity of maintenance employees
   i) Review qualification process maintenance employees to ensure competency levels are achieved for respective work assignments.
   ii) Ensure that existing formal training program is being adhered to and administered to by management and supervisory staff.
   iii) Perform competency testing to ensure the staff have the prerequisite knowledge and skills necessary to proficiently perform the duties of their position safely and efficiently.

d) Third rail maintenance work
   Third rail maintenance work should be reviewed to determine if it needs to be segregated between different departments.

   Current status is that the track inspector is responsible to inspect third rail infrastructure, tunnel lights, and fire extinguishers, and the track system. While the track department may retain the responsibility for installing contact rails; traction power electricians should be considered for maintaining cable connections (both positive and negative), insulators, cover boards, and other auxiliary equipment.

e) Inspection of traction power cables

i) Continue with the development and implementation of a program to inspect traction power cables that could be compromised due to exposure to water and other contaminants. This work is currently being carried out by a dedicated inspection force.

ii) Perform research to determine the highest vulnerability (by infrastructure degradation and safety), and then prioritizing a capital program, and execution.

f) Third rail inspections

i) Review the duties and responsibilities of third rail inspections to determine if it needs to be segregated between different departments.

Based upon the document review, track inspectors do not receive adequate training in inspecting and identifying traction power defects.

ii) Review method for recording rail gauge and contact rail gauge.

Currently these inspectors maintain these records over the distances that appear to be unrealistic, and also due to a requirement to transport too much equipment to efficiently perform job functions.

g) Tunnel - Inspections

Consider joint tunnel inspections on a regular basis (at least quarterly) by intermediate supervisory personnel from track/signals/power/ and facilities.

The supervisor inspections will be in addition to the regular inspections carried out by track walkers. These tunnel inspections would ideally be performed on some type of hi-rail on-track car. These inspections would provide firsthand knowledge and ownership for higher level supervision and serve as quality assurance on the workforce.

h) Foul time

Provide more foul time for inspections.

While this results in delays to revenue service, it will allow for a greater ability to identify and correct deficiencies before they become a major issue. It was stated that “track walkers” for the most part perform visual inspections only and rarely take measurements to determine defects in rail/third rail gauge. Additional foul time will also allow for the opportunity to take measurements in critical areas such as curves and crossings.

i) Track cleaning program

Develop a more robust and comprehensive track cleaning programs for drains, track beds, tunnels walls, insulators etc.

Dust from brake shoes, mud, and water will allow DC current to leak. This results in a less efficient DC system and damage to infrastructure from stray current.

j) Corrosion control program

Develop and maintain a robust corrosion control program - including NACE (National Association of Corrosion Engineers) supervised testing followed by remediation of discovered defects.

A healthy Corrosion Control Program is broken into three primary categories, Maintenance, Testing and Repairs:

- Maintenance:

Inspect for problems that contribute to stray current including rail fasteners, pads, insulated joints, exposed conductors touching the ballast, broken bond or grounding cables, etc. Clean debris from track areas, clean drains to maintain proper drainage, and maintain ballast to 1 inch below rail and clean ballast as needed.

- Testing:

Perform annual rail to earth (RTE) resistance tests on both running rails and contact rails. Perform stray current testing in areas showing increased degradation of surrounding utilities and assets. Perform testing of galvanic anode and impressed current cathodic protection (CP) systems that are protecting various structures throughout the system.

- Repairs:

Troubleshoot and repair problems discovered during RTE testing and inspections. Perform pH, In-situ testing and Chloride, Sulfide and Sulfate concentration testing to identify corrosion products and reactants in areas where corrosion is evident to be used to design repairs to resist the identified conditions.

2. Role of Thermal Imaging

a) Use of the Track Geometry Vehicle (TGV)

Continue to use the TGV which adequately meets current needs.

b) Placement of thermal cameras

Reposition the thermal camera, currently positioned on the front of a revenue train, to the rear and positioned lower.

Based on reports reviewed, hot spots are difficult to see behind cover boards and other obstacles when the camera is placed high. The position of the camera should be at a point where more traction power components can be viewed clearly.

c) Establish parameters for acceptable temperatures.

i) Establish parameters using an ANSI/NETA MTS[2] thermographic survey standards be used as a starting point until industry best practices can be defined (Reference NETA MTS Section 9 and Table 100.18).

Parameters for acceptable temperatures are not yet established for traction power systems industry wide.

[2] ANSI/NETA MTS Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems

ii) Consider possibility of configuring and programing "real time" information and alarms directly to Power Director and Traction Power Supervisors.

d) Thermal guns to supervisory positions
Consider making thermal guns available to all supervisors.
Currently, thermal guns are used by cable inspectors. This will assist in verification of areas and locations in question as result of data obtained from train based equipment. This equipment should also be available for substation maintenance.

e) Personnel in track geometry vehicle
   i) Assign traction power personnel to travel in the track geometry vehicle (TGV).

      This consideration would coordinate data of third rail and thermal imaging directly to traction power department. Alarms may be best based upon geometry recordings to indicate contact rail out of gauge.

   ii) Develop an optimum method for expediting data transmission to interested parties.

   iii) Verify that data is reviewed by each appropriate group and that follow-up actions have been taken and documented prior to the next run of the TGV.

3. Design of third rail and third rail cover boards

a) Verify that all traction power third rail cover boards are made of low smoke zero halogen materials in accordance with NFPA[3] 130.

b) Identify the causal factors why several cover boards are failing and have a plan to address issues.

c) Research alternative means of securement of cover boards in order to facilitate inspection of the securement method.

4. Third Rail Cable Securement

a) Orange Boot
   i) Re-evaluate the use of the orange boot design and consider alternative third rail termination points.
   ii) Consider using multiple smaller conductors to connect feeder and jumper cables to the web of the contact rail which may allow for greater flexibility and less stress on the point of connection.
   iii) Consider the use of a bolted ERICO exothermic connection (Type QV/LS) or similar due to the lack of track side disconnect switches.

[3] NFPA National Fire Protection Association

b) Suitability of clamps for cable termination
Re-evaluate the suitability of clamps for use in any cable termination. The peer review team noted that clamps could become loose over time and continuity could be lost due to corrosion. The Polidori Clamps used to attach the ATC (Automatic Train Control) cables to the running rail should only be used for short term correction of deficiencies, until time is available to install a permanent bond to the rail. The loosening of the clamp and corrosion of the connection contribute to stray current corrosion and negatively impact traction return and track/signal circuits.

c) System wide program for cable insulation integrity
Implement a system wide program to maintain the insulation integrity of traction power cables.

Removing the traction power cables from direct contact with the concrete and ballast will go a long way in protecting the integrity of the insulation and prolonging the life of the cables. Additionally, eliminating the pigtail and terminating the cables to an exothermically welded lug on the third rail will eliminate a potential failure point.

d) Static lean tests with 7000 Series trains
Conduct a static lean test within troublesome curves for problems with the 7000 Series trains.

During the lean test, consideration should be given to third rail shoe contact surface area on the third rail and pressure. The test should be considered jointly with the Safety, Traction Power, Track Department, and Mechanical Department.

5. State of good repair

a) Overtime for catch up work
Consider planned overtime for catch-up maintenance work to be performed.

Based on interviews, maintenance managers consider themselves to be constantly in "catch up" mode. Planned overtime for maintenance purposes could help establish a baseline for state of good repair.

b) Floating slabs
   i) Review the grounding and bonding of floating slabs to determine if it is in compliance with the original design.

      Documentation on floating slabs was limited. However, it appears that the slab is supposed to be isolated with a bond between adjacent slabs to drain off and "leak over". No one interviewed could provide a status of this bonding or if it was ever inspected/tested.

   ii) Examine current state of the substrate beneath the floating slabs to include drainage and isolation issues.

Through the interview process, it is unclear what damage was done when the rubber isolation pads began to deteriorate and what was the condition of the drainage trough under the floating slab.

c) Asset management system

Ensure there is a thorough review of the asset management system and that all assets are accurately captured.

Ensure WMATA's IT Department documents all assets and their respective relationships for optimal use.

A system for parent/child/task setup would better capture the work flow of equipment and costs. It was conveyed to the team during interviews that a rectifier maintenance task was incorrectly shown as an asset instead of a task to be performed on the asset (Rectifier #X), which in turn is a child of the substation asset. Cables were another example where they were just shown as cables without further description whether they were traction power cables, what size, capacity, etc.

d) Utilization of power production crews

i) Consider traction power production crews for capital cable replacement program.
ii) Consider assembling a cable production crew to begin systematically replacing traction power cables/connections.

e) Future capital programs

Future capital programs should be systems based.

During the planning phase, track, structure, signal and traction power should all be considered to allow for each group to make needed improvement within the work zone limits to more efficiently use the track time available.

f) Configuration control and document management

i) Review configuration control and document management procedures to reflect industry practices.

There currently exists some level of configuration control where both the track department and traction power department are working together to create and implement improvements on third rail insulator design and replacement process. However, this is not a formal process.

ii) Facilitate a formal design review submittal process.

A notable area that could be improved is the relationship between Project Management and Force Account (i.e. "operations"). A typical formal process to improve this relationship is through a formal submittal process in which case a Project Manager would have to submit Preliminary, 30%, 60%, 90% plans through a Maintenance of Way Department Head (or their representative) before moving to the next phase of work. This would allow Force Account managers to have a "stake" in the final engineering product or construction project.

6. Third Rail Insulator Cleaning Practices

a) Analysis
An analysis should be performed of the deposits on the third rail insulator to determine their origin and identify remediation.

It was noted that the insulators seemed to be excessively contaminated, even in the yards and open deck track areas. Soiled insulators result in a higher likelihood of arcing and a point of failure.

b) Cleaning program
Develop and maintain an efficient and effective program to clean the insulators.

Consider simple and cost effective ways to clean according to a schedule determined by how quickly the insulators become soiled. Curved brushes with wooden or fiberglass insulated handles may allow for cleaning under traffic. Appendix I shows how one transit agency performs this task.

7. Rail Operations Control Center (ROCC)

A special study should be conducted to determine the optimum work load for the rail controllers.

This study should do an analysis of the roles and responsibilities for various staff, their workloads, and efficiencies. The study should also gauge performance against industry best practices, examine organizational structure, training and adequacy of resources.

Based on the peer review's recommendation, WMATA has requested APTA to conduct a peer review of the ROCC which is now scheduled for late October 2016.

8. Other

a) Data Collection
   i) Develop a program for ensuring data collected is logged, tracked and meaningfully used.
   ii) Ensure that data collected is expeditiously disseminated to the relevant departments.

b) Comments Review Process
Ensure there is a robust formal process and that it carried out which requires comments on design and procurement submittals from stake holders to be solicited, reviewed, documented and dispositioned.

CONCLUDING REMARKS

The findings of this review are intended to assist WMATA in strengthening the safety and effectiveness of its third rail power and infrastructure and the inspection and maintenance programs and strategies.

The panel sincerely appreciates the support and assistance extended throughout the entire peer review process by all WMATA personnel. The panel stands available to assist with any clarification or subsequent support that may be needed.

Appendix A

June 3, 2016

Mr. Richard A. White
Acting President and CEO
American Public Transportation Association
1300 I Street NW, Suite 1200 E
Washington, DC 20005

Subject: WMATA Peer Review Request – Third Rail Power and Infrastructure

Dear Mr. White: Dick

The Washington Metropolitan Area Transit Authority (WMATA) would like to request the American Public Transportation Association (APTA) convene a peer review panel to discuss WMATA's third rail power and infrastructure. While the recent and ongoing arcing insulators and subsequent power issues occurring throughout the system are being addressed individually, a greater holistic approach to these problems is required to determine the systemic causes, contributing factors and the development of mitigating strategies. This peer review will be part of an overall investigation into these issues by WMATA's Department of Safety and Environmental Management (SAFE). The scope of the peer review will encompass:

- A comprehensive review of traction power infrastructure's maintenance and inspection practices, i.e., methodology, frequency of inspections, the identification, classification, documentation, resolution, verification and quality assurance of repaired defects.
- The role of automatic inspections, i.e., TGV and revenue car thermal imaging in the context of defining defects (hot spots) and the method of utilizing this data in a meaningful way.
- A review of third rail cover board design and installation relative to industry best practices.
- A review of third rail cable securement and connectors relative to industry best practices.
- Industry best practices as it relates to state of good repair and capital investment strategies.
- A review of third rail insulator cleaning practices relative to industry best practices.

Washington Metropolitan Area Transit Authority

600 Fifth Street, NW
Washington, DC 20001
202/962-1234

www.metroopensdoors.com

A District of Columbia, Maryland and Virginia Transit Partnership

Appendix A

Mr. Richard A. White
WMATA Peer Review Request – Third Rail Power and Infrastructure
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I would like to request the following industry professionals to be included in the panel: Mr. Antonio Cabrera, Mr. David Knights (or designee) both of Metropolitan Transportation Authority (MTA), Mr. Robert Verhelle of HNTB, and I would welcome additional subject matter experts recommended by APTA. The point of contact for the review is Patrick Lavin our Chief Safety Officer. Pat can be reached at (202) 962-2297.

Please feel free to contact me at (202) 962-1000 should you require any additional information.

Sincerely,

Paul J. Wiedefeld
General Manager and
Chief Executive Officer

Enclosure

Appendix B

APTA Peer Review for the Washington Metropolitan Transit Authority (WMATA) Third Rail Power & Infrastructure July 24 to 29, 2016

Agenda

NOTE:

1. **<u>All times shown are an approximation</u>**
2. Need a screen, projector, 2 easels, flip charts, and marker pens at all times in the meeting room
3. Need Wi-Fi connection at all times in the meeting room
4. May need some photocopying facility at meeting location
5. On Tuesday/Wednesday, WMATA to arrange for 2 rooms for interviews
6. For site visits, WMATA to provide PPE.
7. Peer review members will be required to sign-in daily with WMATA HQ lobby security staff and escorted to meeting room. Lobby personnel contact Chad Krukowski at extension 2-2084 (202-962-2084).

<u>Sunday July 24, 2016</u>

Various times — Peer review team to arrive in Washington, DC.
Members to make their own ground transportation arrangements to the hotel.

6:30 pm — Peer review team members meet in hotel lobby for a get acquainted dinner.

<u>Monday July 25, 2016</u>

7:30 am — Peer review team briefing in the lobby followed by breakfast in the hotel.

9:00 am — Check in at WMATA HQ.

9:15 am — Welcome and introductions

WMATA senior staff Paul Wiedefeld/Andy Off/Pat Lavin/Chad Krukowski

Peer Review
- Scope of work
- Peer review process
- Schedule

9:45 am — Briefing by WMATA senior staff to include an overview presentation and discussion of issues by Pat Lavin and Andy Off (Other WMATA personnel may be available).

12:00 noon Lunch

1:30 pm Continued discussion on issues with Pat Lavin and other personnel.

5:00 pm End of Day 1

7:00 pm Dinner (Location TBD)
- Peer review members
- Strategize work plan for Tuesday

Tuesday July 26, 2016

7:30 am Breakfast in the hotel

9:00 am Check in at WMATA HQ.

9:30 amTransport to Alexandria Rail Yard to review components and other infrastructure.
12:00 noon Lunch at meeting location
1:30 pm Continue with physical tour/inspection
If time permits, peer review team to caucus
5:00 pm End of Day 2
7:00 pm Dinner (Location TBD)
- Peer review members
- Strategize work plan for Wednesday

Wednesday July 27, 2016

7:30 am Breakfast in hotel
9:00 am Check in at WMATA HQ.
9:15am Transport to Alexandria to conduct Interviews
9:30 am Interviews with WMATA staff:
- Mike Davis, General Superintendent Track & Structures
- Paul Miller, Assistant General Superintendent Track Maintenance
- Mike Haas, Acting General Superintendent Traction Power Maintenance
- LeRoy Jones, Assistant General Superintendent of Track Structures
- Brian Poston, Assistant General Superintendent of Track Structures

12:30 pm Lunch

1:30 pm Interviews continue:
- Junior Delgato, Track Supervisor
- Diandra Jackson, Track Inspector
- Mike Brown, Assistant General Superintendent of Track Maintenance
- Dave Newman, General Superintendent ATC Maintenance
- Moustapha Ouattara, Acting Deputy Chief Traction Power Engineering
- TDB, ROCC Controller

5:00 pm End of Day 3
7:00 pm Dinner
- Peer review members
- Strategize work plan for Thursday

Thursday July 28, 2016

7:30 am Breakfast in hotel

9:00 am Check in WMATA HQ

9:15 am	Peer review team deliberation
12:00 noon	Lunch at meeting location
12:30 pm	Peer review team deliberation
5:00 pm	End of Day 4
7:00 pm	Dinner (TBD) • Peer review members • Discuss findings of the day

Friday July 29, 2016

7:30 am	Breakfast in hotel
9:00 am	Check in at WMATA HQ
9:15 am	Peer review team prepare for exit conference presentation
10:30 am	Exit conference briefing and Q&A with WMATA management WMATA management to determine WMATA staff to be in attendance **NO MEDIA FOLKS** Due to a train derailment incident, WMATA management were not able to attend the exit conference as scheduled. This exit conference was rescheduled and held via conference call on Friday August 5, 2016.

Appendix C

List of documents reviewed

- ATC Organization Chart
- CENI Organization Chart
- WMATA Organization Chart
- Power Organization Chart
- Rail Services Organization Chart
- ROCC Organization Chart
- TRPM Organization Chart

Appendix D

Staff Interviewed

- Mike Davis, General Superintendent Track & Structures
- Paul Miller, Assistant General Superintendent Track Maintenance
- Mike Haas, Acting General Superintendent Traction Power Maintenance
- LeRoy Jones, Assistant General Superintendent of Track Structures
- Brian Poston, Assistant General Superintendent of Track Structures
- Junior Delgato, Track Supervisor
- Diandra Jackson, Track Inspector
- Mike Brown, Assistant General Superintendent of Track Maintenance
- Dave Newman, General Superintendent ATC Maintenance
- Moustapha Ouattara, Acting Deputy Chief Traction Power Engineering

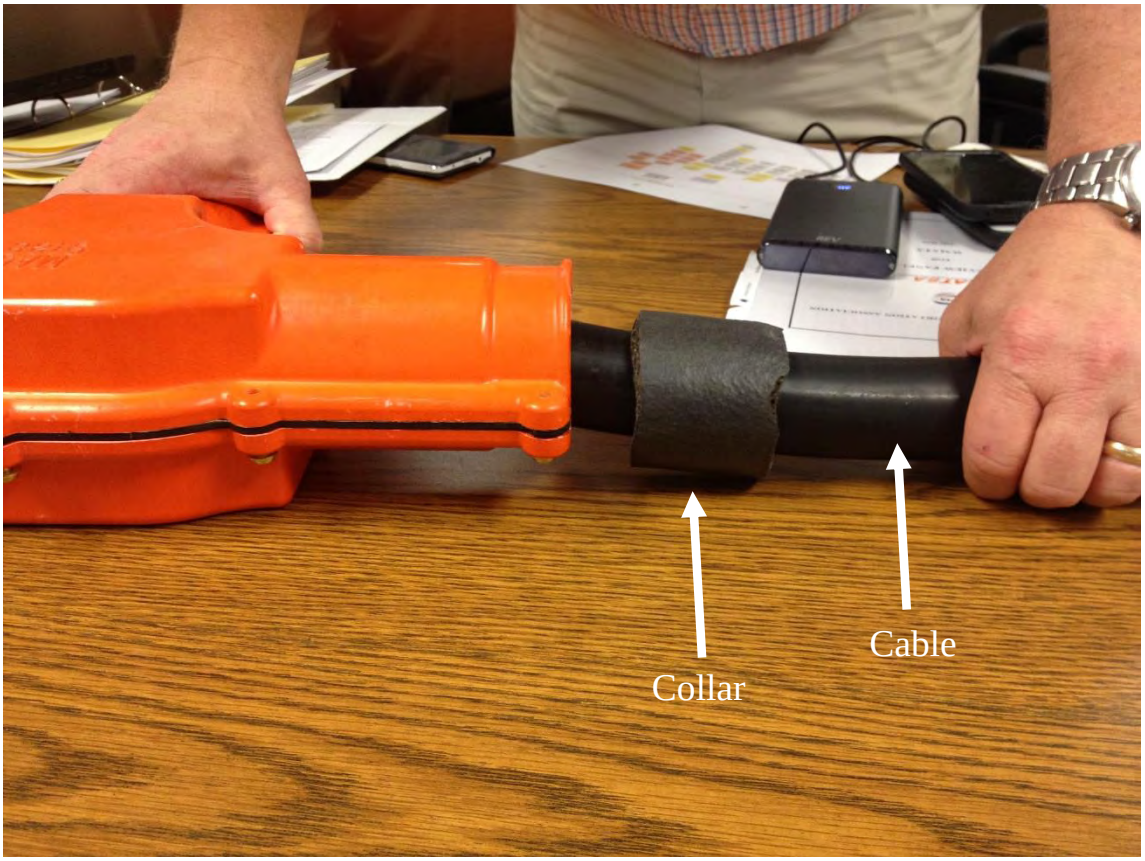
Photo 1: Traction Power Substations Housekeeping

Photo 2: Third Rail Cover Board Securement Assembly

Photo 3: Orange Boot

Metal part of boot showing securing bolts which holds together the cable from the substation to the one feeding the third rail.

The metal part of the boot is enclosed in a plastic boot.



Demonstration of a cable being inserted into the boot with an added collar to minimize dust and dirt instruction in the connection joint area.

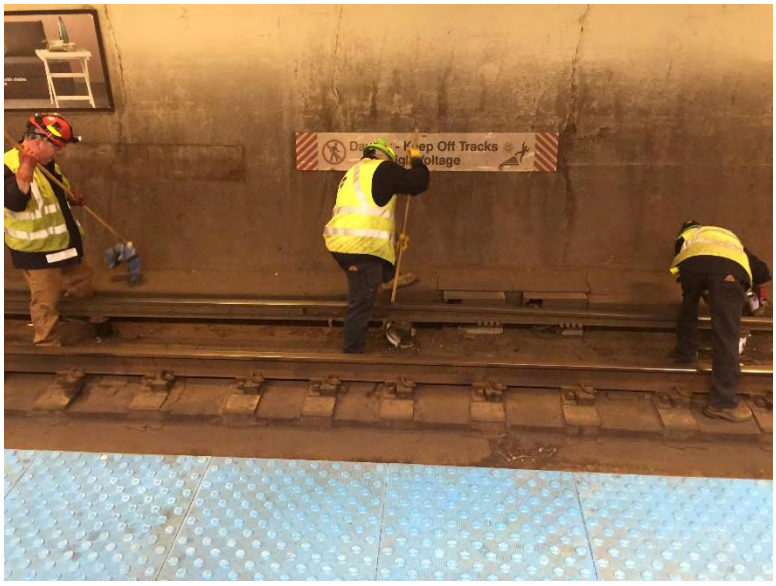
Photo 4: Cleaning of Third Rail Insulators

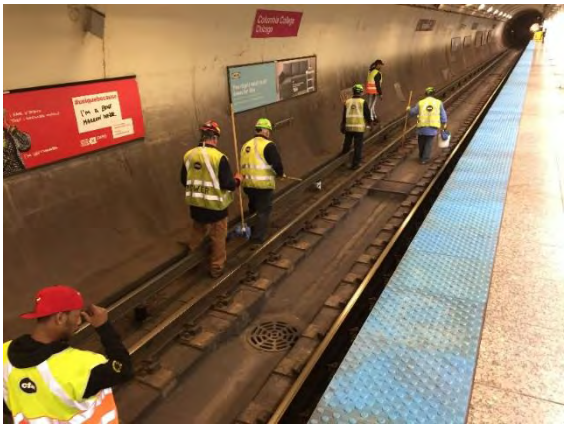
Example of how one transit agency cleans their third rail insulators with traction power switched ON.

Dirty insulator

Brushing insulator

Insulator cleaned and dried





Crew working with flaggers

Photo 5: Photos taken at Alexandria Yard Facility from the Parking Lot

Yard curve with cover board and boots showing wear/age possibly UV issue.

Third rail end with cracked insulator – possibly load imbalance due to curve.

Shows missing cover board and connection.

Photo 5 continued: Photos taken at Alexandria Yard Facility from the Parking Lot

Shows boots and how they leave duct. Some droop-weight can cause weakening over time due to heat.

Third rail heat and joint bars.

Photo 6: Photos taken from Alexandria Station Platform

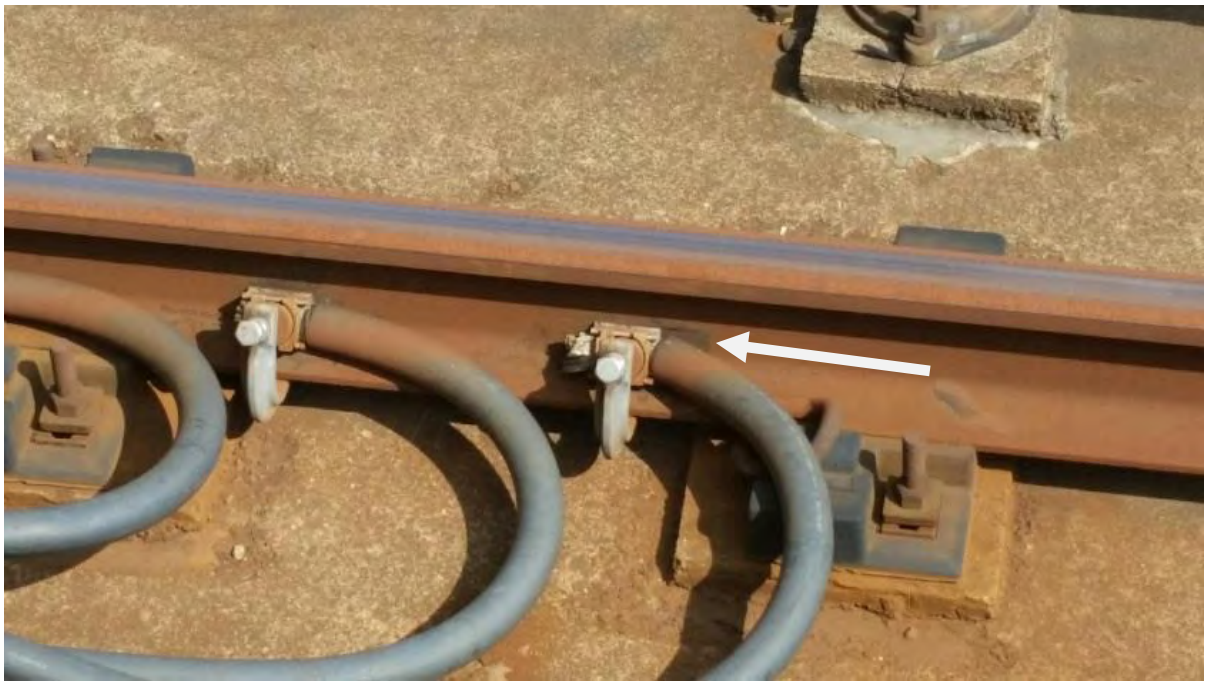
Contact rail anchor improper installation, anchor is bowing due to improper placement of connection on third rail.

Dirty insulator.

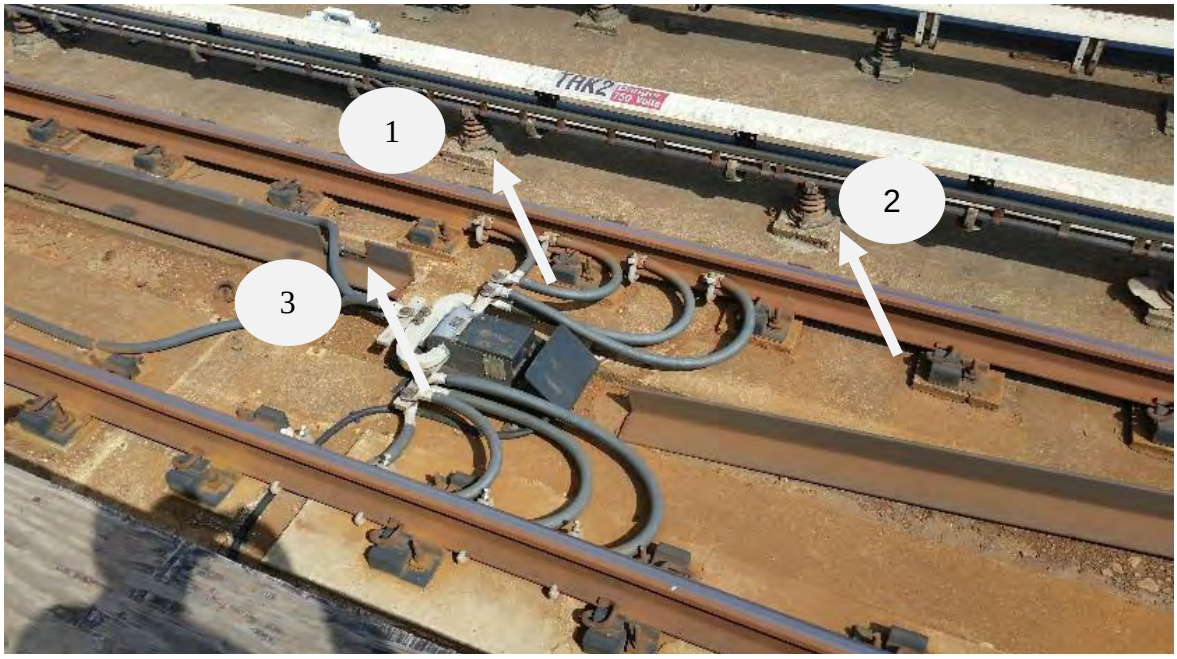
Photo 6 continued: …. Photos from Alexandria Station Platform

Running Rail Joint “C” bond, appears to be in good condition.

Photo 6 continued: …. Photos from Alexandria Station Platform



Signal cable clamped to rail, appears to have been in place for extended period of time. One clamp shows movement on rail.

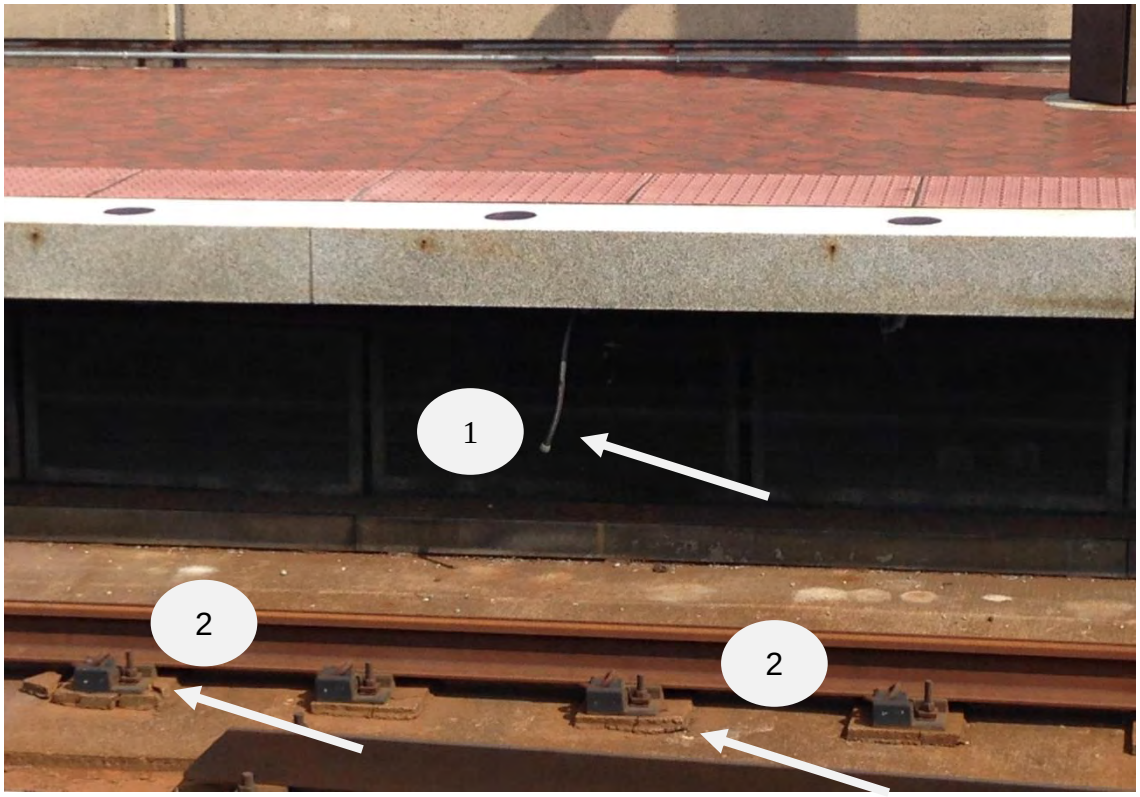


Signal Cable Clamps overall view.

1. Broken insulator support pad.
2. Shims under Insulator not correctly placed.
3. On the signal board, the steel angel was cut away to install the bond but should have been cut back further to help protect the cable.

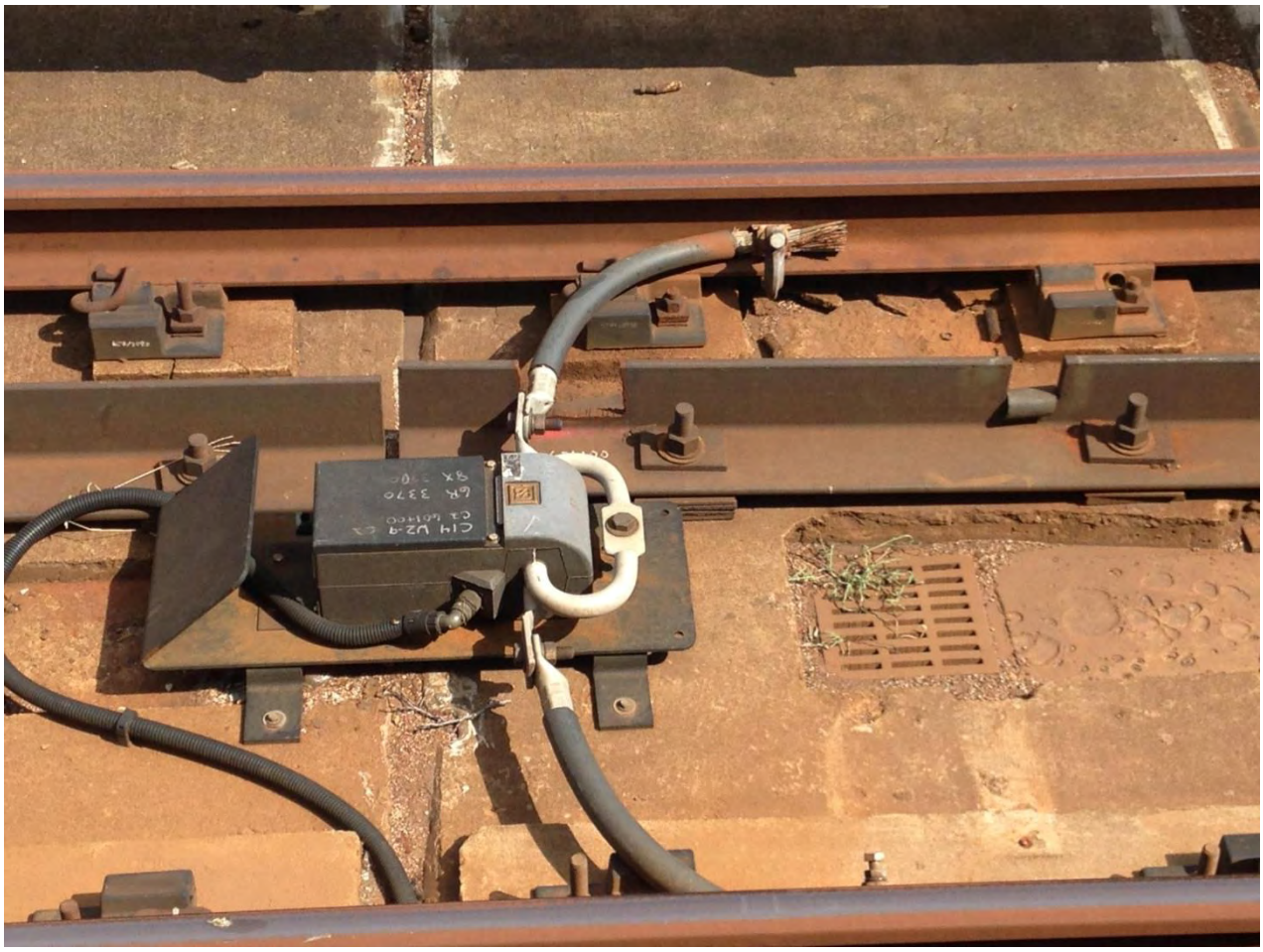
Photo 7: Cable Connection Issues

The third rail connection to the heater control panel is off the rail.



1. Conduit wire to the platform lighting is hanging.
2. Many of the third rail and running rail pedestals are either cracked or crumbling.

Photo 7 continued …. Cable Connection Issues



The impedance bond cable, which appears to have been short to begin with, was moved forward in the Polidori Clamp making it even shorter thereby further limiting the cable to move with the thermal expansion joint.